INSTRUCTION MANUAL

MODEL 630-NA

VOLT-OHM-MILLIAMMETER

MANUAL ONLY - $.50

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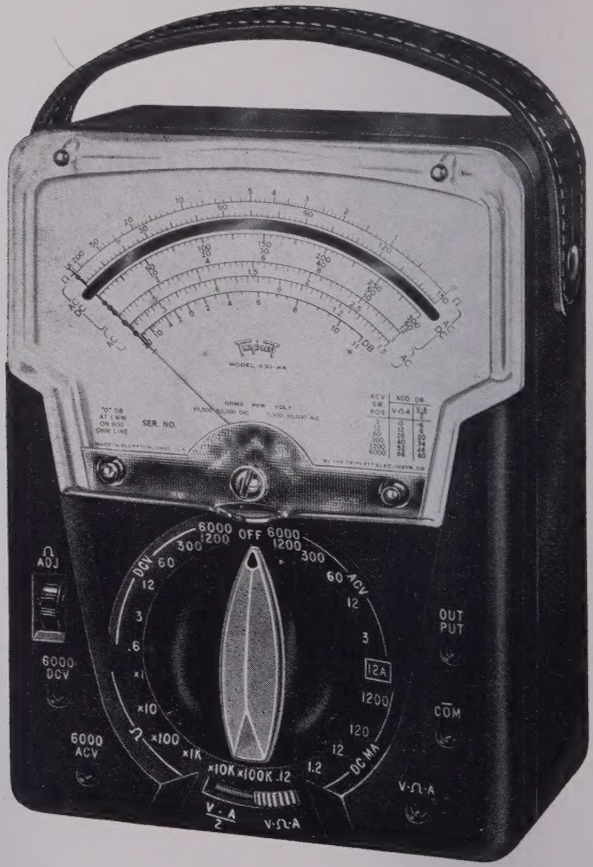

MODEL 630-NA
SER. NO.
OFF
6000
1200
300
60
12
3
.6
DCV
ACV
DC MA
12A
OHMS
ADJ
6000 DCV
6000 ACV
×1
×10
×100
×1K
×10K
×100K
V·Ω·A
COM
OUT PUT

Model 630-NA

16—D. C. VOLTS
0-0.240-0.6-3-12-60-300-1200-6000 at 10,000 Ohms/Volt except 0.240 range
0-0.120-0.3-1.5-6-30-150-600-3000 at 20,000 Ohms/Volt except 0.120 range

12—A. C. VOLTS
0-3-12-60-300-1200-6000 at 5,000 Ohms/Volt
0-1.5-6-30-150-600-3000 at 10,000 Ohms/Volt

12—DB —20 to +77

3—D. C. MICROAMPERES
0-60-600 at 120 M. V. 0-120 at 240 M. V.

7—D. C. MILLIAMPERES
0-6-60-600 at 120 M. V. 0-1.2-12-120-1200 at 240 M. V.

2—D. C. AMPERES 0-6 at 120 M. V. 0-12 at 240 M. V.

3—OHMS 0-1K-10K-100K (4.4-44-440 at center scale)

3—MEGOHMS
0-1-10-100 (4400-44,000-440,000 Ohms center scale)

12—OUTPUT On AC Volt ranges to 1200 V.

GENERAL DESCRIPTION

Accuracy ±1½% on all DC ranges except 3000 and 6000 volt ranges which are ±3%. ±3% on all AC ranges (on 60 cps sine wave) except 3000 and 6000 volt ranges which are ±4%. ±1½% of DC scale with full battery on ohms. All accuracies are per cent of full scale at 77° F. For greatest accuracy, the instrument should be used in the horizontal position in the upper ½ of the scale.

Frequency Response AC Volts through 300 are compensated from 35 CPS to 20 KC.

Meter Protection Meter movement protected against heavy overload by use of germanium diodes.

Scale 4.5" long. AC and DC use same single scale with exception of 1.5 and 3 Volt AC. The single scale is made possible by the high efficiency of the rectifier. Mirror used to eliminate parallax.

Batteries packed separately. See page 25 for installation.

Test Leads One red and one black lead supplied, each 48" long. Two push-on type alligator clips supplied. Banana type plug for low resistance contact.

Accessories Four rubber feet are supplied to fit into four holes provided in the rear of the tester case.

Size 3-11/32" x 5½" x 7½". **Weight** Approx. 4 lbs.

FOREWORD

With your purchase of a Model 630-NA Volt-Ohm-Milliammeter, you have made a worth-while investment, not only in a fine instrument, but backed up by a company which has been making instruments for over a half century. The Triplett Company stands behind your 630-NA and will give all possible assistance in its use and maintenance.

TRIPLETT WARRANTY AND CONDITIONS OF SALE

The Triplett Electrical Instrument Company warrants instruments manufactured by it to be free from defective material or factory workmanship and agrees to repair or replace such instruments which under normal use and service, disclose the defect to be the fault of our manufacturing. Our obligation under this warranty is limited to repairing or replacing any instrument or test equipment which proves to be defective, when returned to us transportation prepaid within ninety (90) days from the date of original purchase .

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons or service stations in any way so as, in our judgment, to injure their stability or reliability or which have been subject to misuse, negligence or accident or which have had the serial number altered, effaced, or removed. Neither does this warranty apply to any of our products which have been connected, installed, or adjusted otherwise than in accordance with the instructions furnished by us. Accessories including all vacuum tubes and batteries not of our manufacture used with this product are not covered by this warranty.

The Triplett Electrical Instrument Company reserves the right to discontinue models at any time, or change specifications or design, without notice and without incurring any obligation.

Upon acceptance of the material covered by this invoice the purchaser agrees to assume all liability for any damages and bodily injury which may result from the use or misuse of the material by the purchaser, his employees, or others, and that The Triplett Electrical Instrument Company shall incur no liability for direct or consequential damage of any kind.

Parts will be made available for a maximum period of five (5) years after the manufacture of this equipment has been discontinued. Parts include all materials, charts, instructions, diagrams, accessories, et cetera, which were furnished in the standard or special models.

This warranty and conditions of sale are in lieu of all others expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

The Triplett Electrical Instrument Company
Bluffton, Ohio

GENERAL DESCRIPTION AND FAMILIARIZATION

The model 630-NA is a combination multi-range measuring instrument offering several functions heretofore unavailable in the conventional Volt-Ohm-Milliammeter. This instrument was designed for those who require better accuracy, measurements over a multiplicity of ranges and frequencies together with greater dependability and simplicity of operations. The following notes may be helpful in understanding some of the new functions of this instrument.

For greater accuracy it is usually best to select a range such that the meter will read in the upper half of the scale. On the model 630-NA, all voltage and current ranges can be split in half by a simple slide switch located below the range knob, thus permitting best scale utilization. Splitting the range also changes the meter sensitivity so that loading effects in sensitive circuits can be observed. In these instances, the actual meter reading may differ when the range is split due to circuit loading. These readings should therefore be taken at the appropriate meter sensitivity.

The model 630-NA incorporates special germanium diodes to prevent damage to the meter movement on accidental overloads. Since most resistors will withstand quite severe instantaneous overloads, it is usually the meter movement that is damaged on overload in conventional multi-meters. Overloads of 1000 times have been applied to the meter movement of the model 630-NA without affecting accuracy.

Compensation of the AC voltage ranges over the audio range provides a new function for this type instrument. At the extreme high frequencies, some variation is to be expected by location of the test leads. Generally it is suggested the leads be kept as far from the chassis and high frequencies components as possible. Use of the alligator clips to clip the lead to the circuit when possible will avoid hand capacity effects.

High Voltage Power Caution: Where power source exceeds 18 watts do not use for higher voltage measurements — 6000 volts — 1200 volts.

Measuring DC Volts

Rotate the selector switch to the appropriate range for DC volts. Always start with the highest range if in doubt as to the approximate voltage. In choosing ranges, endeavor to have the readings fall in the upper, or right hand, half of the scale for greatest accuracy.

Plug the black test lead into the "COM" jack and the red lead into the V-Ω-A jack as shown on page 7.

CAUTION on DC Volts do not measure DC voltages having an AC component greater than 450 volts peak. Insulation is tested to withstand a maximum of 1650 rms volts.

Connect the test prods ACROSS the voltage source. The red lead is positive. Where polarity is difficult to determine, the meter may read backwards. No damage will be done if this occurs. Simply reverse the leads.

All DC ranges are read on the two black center scales; one directly above the mirror, the other just below the mirror.

With Slide Switch In V-Ω-A Position:

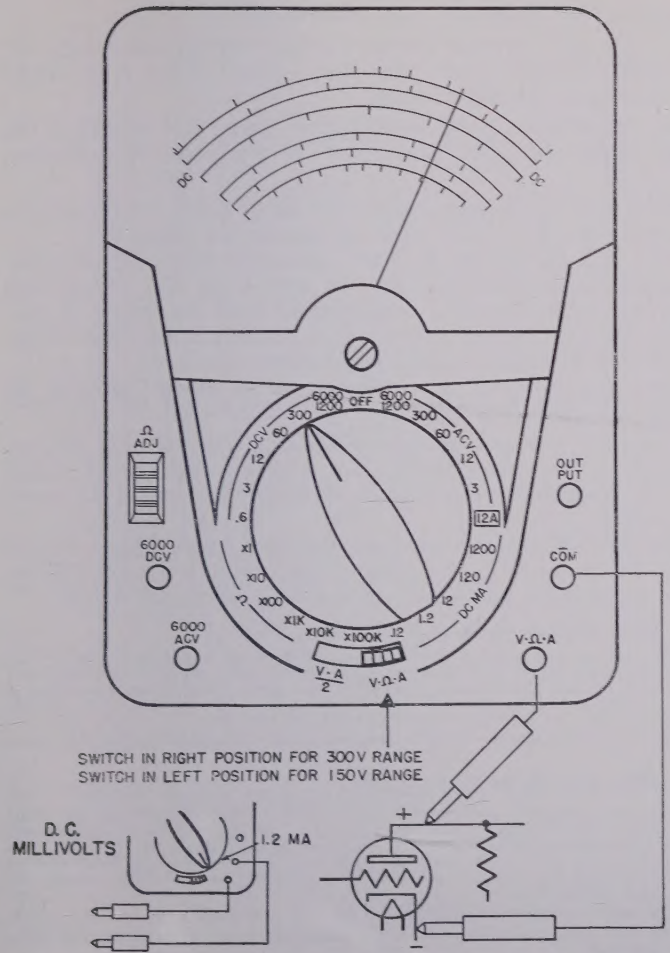
The full scale reading of the instrument is identical to that indicated by the large range switch knob. Thus with the range switch knob at 3 note that the 3 volt range is read on the 300 volt scale simply by dropping two zeros (i. e. dividing by 100). Other ranges are read similarly by adding or omitting zeros as required. The meter sensitivity is 10,000 ohms per volt with slide switch in V-Ω-A position.

With Slide Switch In $\frac{V\text{-}A}{2}$ Position:

The instrument will read exactly half of the value indicated by the large range switch knob. Thus with the range knob set at 300, the meter actually will read 150. The scale immediately above the mirror is used for 0-150 volts. With the range switch knob set on 60, the meter will read 30 volts full scale. Read this on the 300 volt scale by dropping one zero (i e. dividing by 10). Other ranges are handled in a similar fashion. The meter sensitivity is 20,000 ohms per volt with the slide switch in $\frac{V\text{-}A}{2}$ position.

In order to read D. C. millivolts, the full scale value will be 240 MV with the slide switch to the right and 120 MV with the slide switch to the left, when placing the knob of the selector switch in the .12 or 1.2 D. C. Ma ranges for either of the MV readings. Sensitivity will not be 10,000Ω/V and 20,000Ω/V at 240 MV and 120 MV respectively.

For handy operation chart see pages 16 and 17



CAUTION: For maximum safety do not handle tester or leads when connected to high voltages. Make certain that no condensers are charged by a high voltage.

Measuring AC Volts

Rotate the selector switch to the appropriate range for AC volts. Always start with the highest range if in doubt as to the approximate voltage.

In choosing ranges, endeavor to have the readings fall in the upper, or right hand, half of the scale for greatest accuracy.

Plug the black test lead into the "COM" jack and the red lead into the V-Ω-A jack as shown on page 9.

The AC range up to and including 300 volts is compensated for frequencies from 35 cps to 20 KC. Over this range an additional 5% accuracy should be allowed, primarily for the higher ranges and frequencies. The lower frequencies will exhibit negligible error.

CAUTION: When measuring up to 6000 volts, set the selector switch on the 6000/1200 range, plug the red lead into the jack marked "6000 ACV" and leave the black lead in the "COM" jack.

Connect the test probes ACROSS the voltage source. As there is no polarity on AC, the red and black leads may be interchanged without causing the meter to read backwards.

All AC ranges are read on the two black center scales except 3V and 1.5V. For greater accuracy two separate red scales have been provided to read 3V-AC and 1.5V-AC.

With Slide Switch In V-Ω-A Position:

The full scale reading of the instrument is identical to that indicated by the large range switch knob. Thus with the range switch knob at 1200, note that 1200 volts is read on the 12 volt scale by adding two zeros (multiplying your reading by 100). There are scales provided for 1.5, 3, 12, 60, 150 and 300. Other ranges are read similarly by adding or omitting zeros as required.

The meter sensitivity is 5000 ohms per volt with slide switch in V-Ω-A position.

With Slide Switch In $\frac{V \cdot A}{2}$ Position:

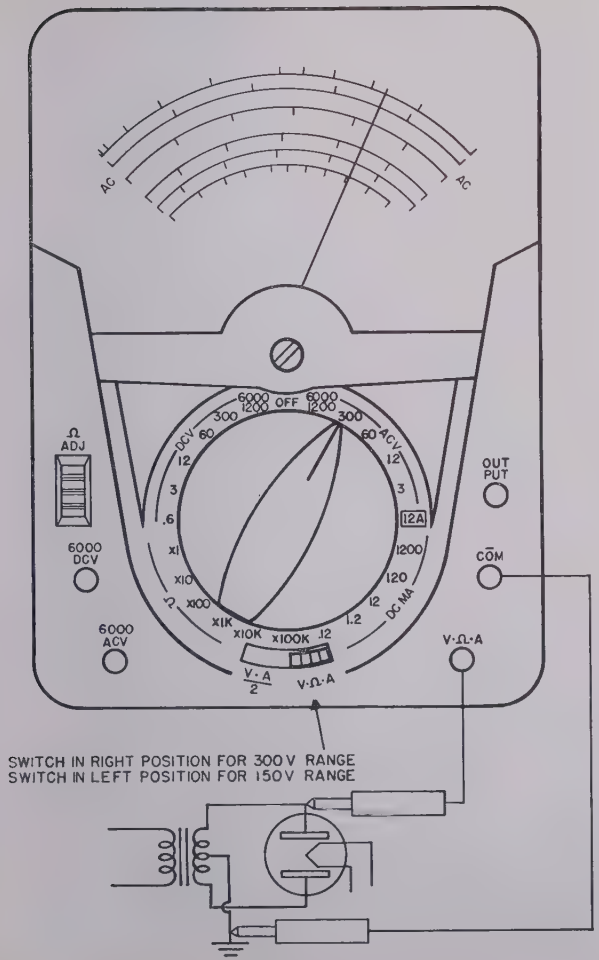
The instrument will read exactly half of the value indicated by the large range switch knob. Thus with the range knob set at 300, the meter actually will read 150. The scale immediately above the mirror is used for 0-150 volts. With the range switch knob set on 60, the meter will read 30 volt full scale. Read this on the 300 volt scale by dropping one zero (i. e. dividing by 10). Other ranges are handled in a similar fashion.

The meter sensitivity is 10,000 ohms per volt with the switch in this position.

CAUTION For maximum safety do not handle tester or leads when connected to high voltages.

For handy operation chart see pages 16 and 17

Measuring AC Volts



Measuring DC Resistance

Rotate the selector switch to the appropriate range for ohms determined from the following chart:

To read ohms the slide switch must be in the right or V-Ω-A position.

0-1,000	ohms	X1
0-10,000	ohms	X10
0-100,000	ohms	X100
0-1,000,000	ohms	X1K
0-10,000,000	ohms	X10K
0-100,000,000	ohms	X100K

Plug the black test leads into the "COM" jack and the red lead into the V-Ω-A jack as shown on the opposite page.

Short the test probes together and adjust the Ω-ADJ control until the meter pointer reads 0 on top red ohms scale.

Connect the test probes across the resistor as shown. If the resistor is wired in a circuit, disconnect one end of the resistor before taking the reading.

Each time an ohm range is changed, it is well to check the zero setting as outlined in paragraph above.

The basic scale 0-1K (0-1000 ohms) is used for reading all ohm ranges. Simply multiply the scale numbers by 10, 100, 1K, 10K, 100K as indicated by the selector switch setting.

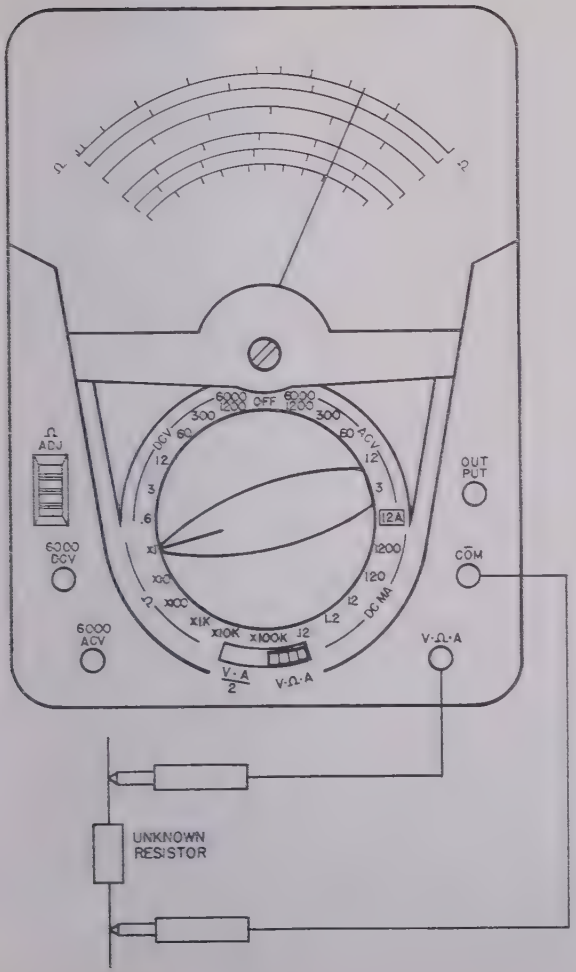
It should be kept in mind that in the measurement of resistance a current is passed through the unknown resistor. Generally this current is so small as to be negligible. However, on the XI range fairly high current is employed.

CAUTION: On the XI ohm position reading at center scale (4.4 ohms) the current drain from the 1.5 volt battery is 170 MA. It is desirable to make a practice of using one of the higher ohm ranges for general continuity or circuit testing to extend the life of the batteries.

Since the scale of an ohmmeter is non-linear, the accuracy of the reading cannot be expressed as a per cent of full scale. Ohmmeter accuracy is generally referred to a linear scale such as the DC volt scale. Thus ±3% ohmmeter accuracy means an allowable ± 1.8 division on the 60 division DC scale. For example 2 ohms could read from about 1.75 to 2.3 ohms and be within tolerance.

For handy operation chart see pages 16 and 17

Measuring DC Resistance



Measuring DC Current

Rotate the selector switch to the appropriate range for DC current. Always start with the highest range if in doubt as to the approximate current.

In choosing ranges, endeavor to have the readings fall in the upper, or right hand, half of the scale for greatest accuracy.

Plug the black test probe into the "COM" jack and the red probe into the V-Ω-A as shown on opposite page.

Connect the test probes in series with the circuit to be measured. Do not test directly across any potential circuits as this may burn out the shunt. The red lead is positive. Where polarity is difficult to determine, the meter may read backwards. No damage will be done if this occurs. Simply reverse the leads.

All DC current ranges are read on the scale just below the mirror.

With Slide Switch in V-Ω-A Position

The full scale reading of the instrument is identical to that indicated by the large range switch knob. Thus with the range switch knob at 120 note that the 0-120 Milliamperes is read on the 12 Milliampere scale simply by adding one zero (or multiply by 10). Other ranges are read similarly by adding or omitting zeros as required.

With Slide Switch In $\frac{V\text{-}A}{2}$ Position:

The instrument will read exactly half of the value indicated by the large range switch knob. Thus with the range knob set at 120 the meter actually will read 60 Milliamperes.

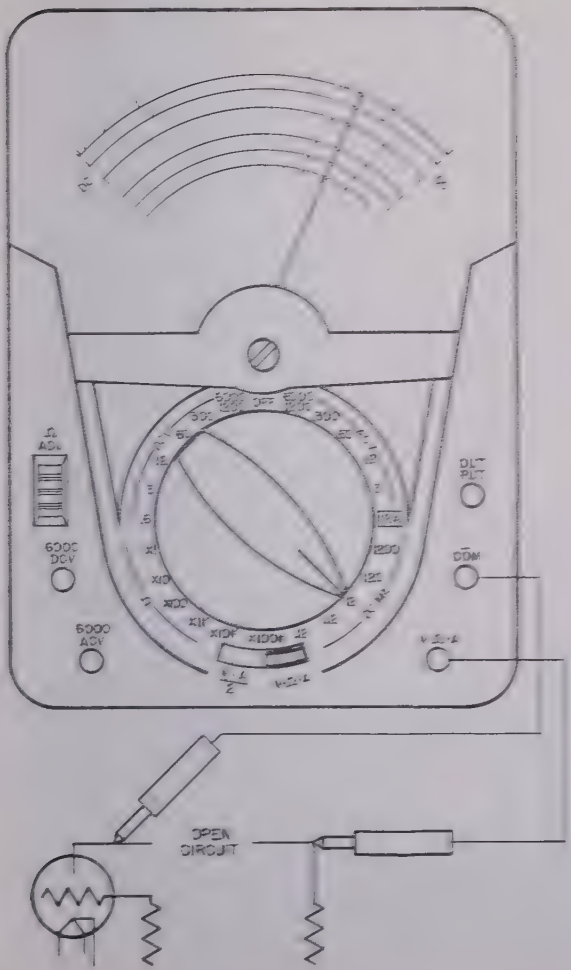
Other ranges are handled in a similar fashion.

CAUTION: Turn off the power before connecting the meter to the circuit. Do not handle the tester or leads in high voltage circuits.

In using the 60 microampere range, the meter reading may differ from actual calculations. This is sometimes caused in low current circuits by a slight leakage of voltage due to moisture. Other times a slight potential is generated by soldering or joining dissimilar metals. Even the proximity of fumes or liquid acids and alkalies may react with the metal parts of the circuit and generate slight current. The fingers should not be permitted to touch the metal parts of the probes or circuit, as body resistance can also upset some circuits.

For handy operation chart see pages 16 and 17

Measuring DC Current



Measuring Output Volts (DB)

Output is generally measured in units called the decibel, a terminology used to indicate power levels in amplifiers or telephone work. The DB scale on your meter is based on the voltage developed across a 600 ohm line when .001 watts is dissipated in the line. Do not confuse the DB with the VU (Volume Unit).

Rotate the selector switch to the appropriate AC volt range, see page 8. Refer to the small chart on the meter dial for the range to use. Always start with the highest range if in doubt as to the approximate number of decibels.

Normally it is recommended output be measured by plugging the black test lead into the "COM" jack and the red lead into the "OUTPUT" jack.

Often a DC voltage is present in the circuit where output is to be measured. The extra jack marked "OUTPUT" with a .1 mfd condenser in series is provided to block the DC.

The condenser impedance is generally disregarded in most measurements. Where no DC is present, this output voltage can be read accurately by using the 630-NA as a regular AC voltmeter (i. e. by plugging the red lead into the "V-Ω-A" jack instead of "OUTPUT").

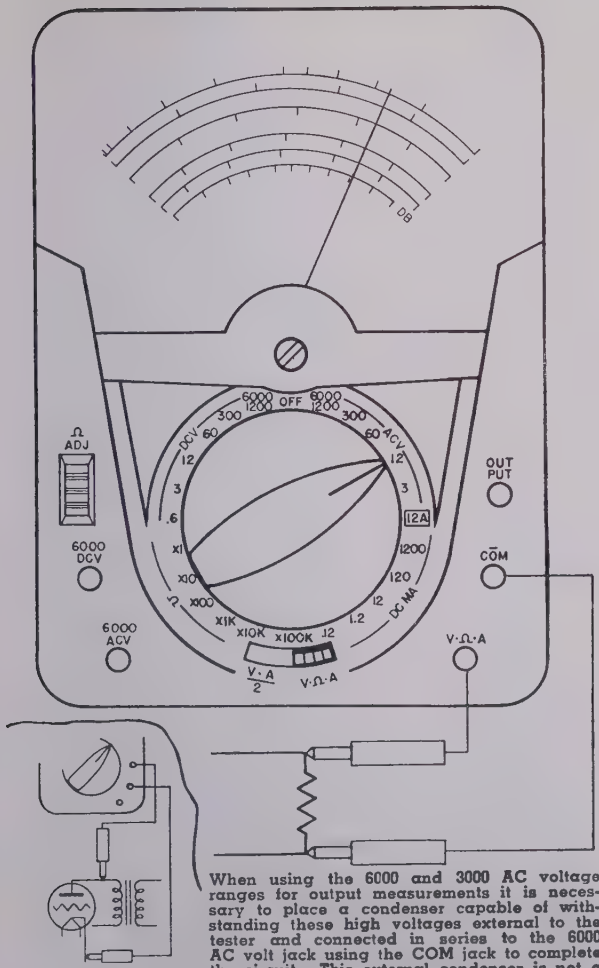
Connect the test prods across the plate circuit or 600 ohm line.

Read all DB ranges on the bottom black scale, with the small chart on the meter dial. For example, when the selector switch is set on the 3 AC volt range and the slide switch in V-Ω-A position, the DB scale is direct reading. When on the 12 AC volt range, add 12 to each number on the DB scale, thus with the meter reading -2, the actual DB reading is +10 DB.

If line impedance is not 600 ohms (as in speaker voice coils) the readings will be only relative — not actual DB.

When measuring AC volts of high frequency such as 15,000 to 20,000 cycles it is best to clip the leads to the voltage point under test. Hand capacity can affect the voltage reading at high frequency.

For handy operation chart see pages 16 and 17



When using the 6000 and 3000 AC voltage ranges for output measurements it is necessary to place a condenser capable of withstanding these high voltages external to the tester and connected in series to the 6000 AC volt jack using the COM jack to complete the circuit. This external condenser is not a furnished part of the equipment.

To MEASURE	SET SELECTOR SWITCH TO	SET SLIDE SWITCH
DC VOLTS		
.12 (120 MV.)	.12 MA	V-A÷2 Position
.24 (240 MV.)	.12 MA	V-Ω-A Position
.3	.6 DCV	V-A÷2 Position
.6	.6 DCV	V-Ω-A Position
1.5	3 DCV	V-A÷2 Position
3	3 DCV	V-Ω-A Position
6	12 DCV	V-A÷2 Position
12	12 DCV	V-Ω-A Position
30	60 DCV	V-A÷2 Position
60	60 DCV	V-Ω-A Position
150	300 DCV	V-A÷2 Position
300	300 DCV	V-Ω-A Position
600	1200 DCV	V-A÷2 Position
1200	1200 DCV	V-Ω-A Position
3000	6000 DCV	V-A÷2 Position
6000	6000 DCV	V-Ω-A Position
AC VOLTS		
1.5	3 ACV	V-A÷2 Position
3	3 ACV	V-Ω-A Position
6	12 ACV	V-A÷2 Position
12	12 ACV	V-Ω-A Position
30	60 ACV	V-A÷2 Position
60	60 ACV	V-Ω-A Position
150	300 ACV	V-A÷2 Position
300	300 ACV	V-Ω-A Position
600	1200 ACV	V-A÷2 Position
1200	1200 ACV	V-Ω-A Position
3000	6000 ACV	V-A÷2 Position
6000	6000 ACV	V-Ω-A Position
DC CURRENT		
.06 MA	.12 MA	V-A÷2 Position
.12 MA	.12 MA	V-Ω-A Position
.6 MA	1.2 MA	V-A÷2 Position
1.2 MA	1.2 MA	V-Ω-A Position
6 MA	12 MA	V-A÷2 Position
12 MA	12 MA	V-Ω-A Position
60 MA	120 MA	V-A÷2 Position
120 MA	120 MA	V-Ω-A Position
600 MA	1200 MA	V-A÷2 Position
1200 MA	1200 MA	V-Ω-A Position
6 Amp.	12 Amp	V-A÷2 Position
12 Amp.	12 Amp	V-Ω-A Position
OHMS		
0 to 1,000	×1 OHMS	V-Ω-A Position
0 to 10,000	×10 OHMS	V-Ω-A Position
0 to 100,000	×100 OHMS	V-Ω-A Position
0 to 1,000,000	×1000 OHMS	V-Ω-A Position
0 to 10 Meg	×10K OHMS	V-Ω-A Position
0 to 100 Meg.	×100K OHMS	V-Ω-A Position
DECIBELS		
—20 to +63 (To+ 77 see page 15)	Select AC range according to table on Dial.	V-Ω-A or V-A÷2

CONNECT TEST LEADS IN JACK MARKED	READ ON SCALE	MULTIPLY OR DIVIDE SCALES
V-Ω-A & COM	12	÷100
V-Ω-A & COM	12	÷50
V-Ω-A & COM	300	÷1000
V-Ω-A & COM	60	÷100
V-Ω-A & COM	150	÷100
V-Ω-A & COM	300	÷100
V-Ω-A & COM	60	÷10
V-Ω-A & COM	12	Read Direct
V-Ω-A & COM	300	÷10
V-Ω-A & COM	60	Read Direct
V-Ω-A & COM	150	Read Direct
V-Ω-A & COM	300	Read Direct
V-Ω-A & COM	60	×10
V-Ω-A & COM	12	×100
6000 DC & COM	300	×10
6000 DC & COM	60	×100
V-Ω-A & COM	1.5	Read Direct
V-Ω-A & COM	3	Read Direct
V-Ω-A & COM	60	÷10
V-Ω-A & COM	12	Read Direct
V-Ω-A & COM	300	÷10
V-Ω-A & COM	60	Read Direct
V-Ω-A & COM	150	Read Direct
V-Ω-A & COM	300	Read Direct
V-Ω-A & COM	60	×10
V-Ω-A & COM	12	×100
6000 AC & COM	30	×100
6000 AC & COM	60	×100
V-Ω-A & COM	60	÷1000
V-Ω-A & COM	12	÷100
V-Ω-A & COM	60	÷100
V-Ω-A & COM	12	÷10
V-Ω-A & COM	60	÷10
V-Ω-A & COM	12	Read Direct
V-Ω-A & COM	60	Read Direct
V-Ω-A & COM	12	×10
V-Ω-A & COM	60	×10
V-Ω-A & COM	12	×100
V-Ω-A & COM	60	÷10
V-Ω-A & COM	12	Read Direct
V-Ω-A & COM	Green Ohm 0-1000	Read Direct
V-Ω-A & COM	Green Ohm 0-1000	×10
V-Ω-A & COM	Green Ohm 0-1000	×100
V-Ω-A & COM	Green Ohm 0-1000	×1000
V-Ω-A & COM	Green Ohm 0-1000	×10,000
V-Ω-A & COM	Green Ohm 0-1000	×100,000
V-Ω-A & COM or OUTPUT & COM	**DB**	Use Table On Dial

OPERATION

Measuring Capacity

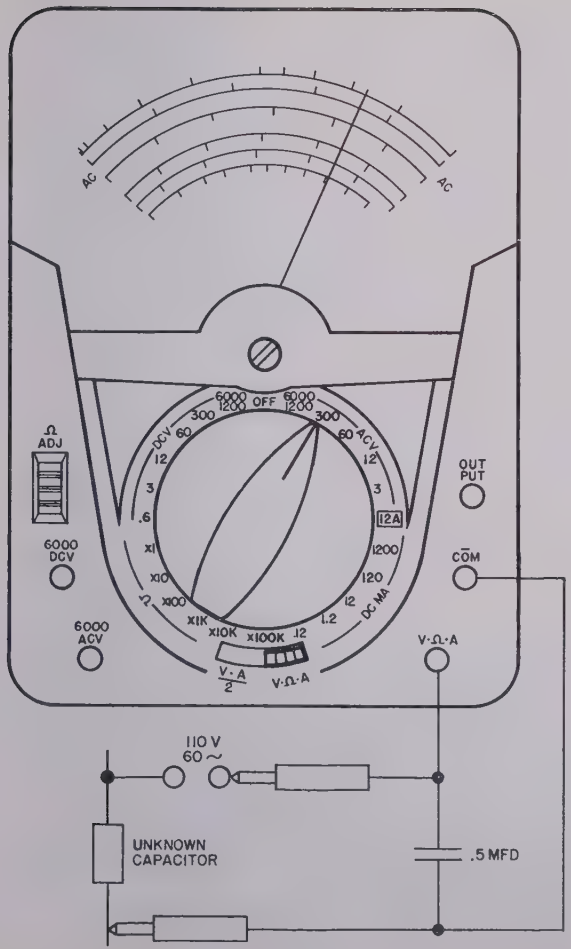
Your 630-NA can be used to measure capacity by the arrangement shown on opposite page. For such measurements the tester is set up as an AC voltmeter.

Use the following chart to determine the AC voltage range to use. ALWAYS start with the selector switch on the 300 volt range for if the condenser is shorted, serious damage may result to the meter when on a low range.

To Measure MFD	Set Selector Switch to	Deflection in AC Volts
.002	3 ACV	.45
.004		.83
.006		1.25
.008		1.65
.010		2.10
.020	12 ACV	4.3
.04		7.7
.05		9.7
.08	60 ACV	14.5
.10		17.5
.2		30.0
.4		45.0
.6		57.0
.8	300 ACV	65.0
1.0		75.0
2.0		85.0
5.0		95.0
10.0		100.0

CAUTION: DO NOT ATTEMPT TO USE THIS TEST ON ELECTROLYTIC CONDENSERS.

Measuring Capacity

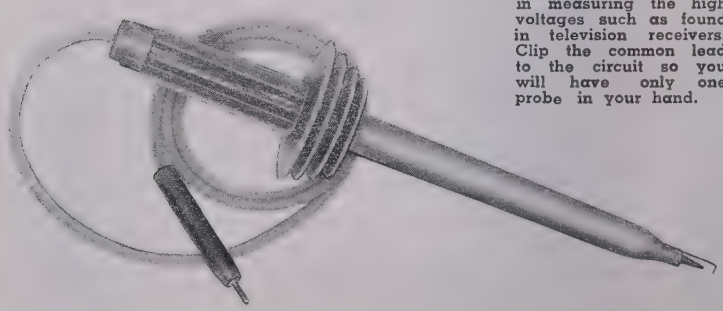


Measuring Kilovolts

For measuring the high voltage employed in television receivers and in other applications, an external probe is available. Probes are made in three ranges, 0-12,000, 0-30,000 and 0-60,000 volts Common usage is on DC. Probes for AC are also available in the lower ranges.

To use the D. C. Kilovolt probe set the range selector switch on the 3 volt D. C. position, and set the slide switch on the V-Ω-A position. When the A. C. probe is used set the range selector switch on the 3 volt A. C. position, set the slide switch on the V-Ω-A position. Plug the Kilovolt probe lead into the V-Ω-A jack at the lower right corner of the front panel. Use the black standard lead for negative or common lead with it connected into the COM jack located on the lower right side of front panel.

Kilovolt Probe	Set Selector Switch	Set Slide Switch	Read on Range	Multiply By
0-30KV DC	3 V DC	V-Ω-A	0-300V	100
0-30KV AC	3 V AC	V-Ω-A	0-300V	100
0-60KV AC	3 V AC	V-Ω-A	0-60V	1000



USE EXTREME CAUTION in measuring the high voltages such as found in television receivers. Clip the common lead to the circuit so you will have only one probe in your hand.

Measuring High DC Current

External plug-in shunts are available to extend the DC current ranges of your 630-NA from the self-contained 0-12 amps range to 0-30 amps. External portable shunts up to 120 amperes also are available. (See paragraph on accessories.)

Set the 630-NA selector switch to the 12 Ma. position and plug the desired external shunt into the COM and V-Ω-A jacks. Connect the line to be measured to the binding posts on top of the shunts. The external portable shunts are too large to plug into the panel and must be connected to the panel jacks by the leads furnished with the shunts.

Accessories

The following accessories for your 630-NA are available from your distributor:

Item	Part No.
Hi-Voltage probe 0-30 Kv DC & 0-60 Kv AC	T-79-152
Hi-Voltage probe 0-30 Kv AC	T-79-71
Carrying cases	639, 639-N, 639-P
Plug-in external shunt 0-30 DC Amp.	T-91-429
Portable external shunt 0-60 DC Amp.	T-91-430
Portable external shunt 0-120 DC Amp.	T-91-431
Tester Stand (Holds tester at approximately 45° angle while working on bench.)	T-255A-33
Clamp-On Ammeter Adapter Model 10	60-A-211
Lead Assembly No. 611 (used in connection with Model 10)	79-A-160
Line Separator, Model 101 (used in connection with Model 10)	60-A-218

ADDITIONAL APPLICATIONS

In The Home

When your refrigerator motor fails to "kick out" the starting winding, use the 630-NA to measure the AC line voltage. If the voltage is below 100 volts, notify your power company.

If your electric stove does not seem to heat quickly enough, measure the voltage input to the stove with all burners turned on and again with all burners turned off. If the difference between these two voltages is 10 or 15 volts, the power cable to the stove has defective connections or is not of large enough current carrying capacity.

Blown fuses sometimes do not visibly indicate they are burned out. With your 630-NA, measure the voltage ahead of and behind the fuse. Voltage ahead of the fuse but no voltage following indicates a blown, defective, or loose fuse. Sometimes it is easier to remove the fuse and measure its resistance. This should be substantially zero.

Your 630-NA is handy for locating trouble in desk and floor lamps. Pull the plug from the wall socket and check for a faulty cord, plug, switch, socket, or bulb by measuring resistance on the Ω-X1 range. 100 watt 120 volt bulbs should read 10 to 20 ohms. 50 watt 120 volt bulbs should read 20 to 40 ohms.

For the Radio Man

In addition to all common voltage, current, and resistance measurements used in servicing radios, the high sensitivity of your 630-NA is well adapted to measuring AFC, AVC, bias and FM discriminator voltages.

Measurements of high voltage up to 27,000 volts used in some television receivers for the picture tube can be effected with the special high voltage probe shown on page 20.

Considerable trouble is had with leakage in automobile radio antennas (due to moisture). Your 630-NA with the high ohm range 0-100 meg. is ideal to check this leakage. Disconnect the antenna from the receiver before making this check.

In The Industrial Plant

Your 630-NA will be a big help in checking voltage drop caused by adding that extra machine on the already overloaded line. Correcting this will often save time later when a rush comes and the line "just happens" to burn up.

First measure the voltage at the machine with the machine turned off; then again with the machine in operation. If the voltage is proper with the machine off but low with the machine in operation, the circuit wiring or transformers have too small a capacity. If the voltage is low even with the machine off, the circuit is probably already overloaded and the machine should be wired into another circuit.

Equipment using automatic electric controls can be checked with the 630-NA. Faulty relay or control action is often caused by low voltage applied to the relay or control. This low voltage in turn, may be caused by burned or dirty contacts on the control device. Use the ΩX1 range to check for high or unstable contact resistance.

When a phone on your dial telephone system fails, measure the line current and the voltage to the particular relay in question. If the voltage is proper, measure the contact resistance of the relay contacts using the ΩX1 scale on your 630-NA. If this resistance is over a fraction of an ohm or if the resistance seems to waver, clean and adjust the relay contacts.

In The Garage

Fuses in the automobiles have a tendency to look perfectly good and yet not function due to corrosion under the metal end cap. Measure the voltage ahead and behind the fuse to determine a defective unit. Or remove the fuse and measure its resistance. Anything over a fraction of an ohm is too high.

Checking automobile wiring, light switches, heaters, radios, etc., can be speeded up by simple use of your 630-NA.

In The Laboratory

Your 630-NA is built with all precision, non-aging resistors. The specially designed switch and special banana type plugs insure lasting accuracy. The meter with specially finished and selected pivots and jewels and a well designed stable magnet further makes the 630-NA a must for the laboratory.

Special Applications

The unusually high range ohmmeter in your 630-NA permits some indication of condenser leakage resistance. Measure as a resistor, see page 10, using the highest range. A good paper or mica condenser under 1 mfd. will indicate at the 100 Meg. mark or above. If a steady reading (taken after the initial surge required to charge the condenser) of less than 100 megohms is obtained, the condenser probably has defective insulation. Good paper condensers over 1 mfd. may read somewhat less than 100 megohms. Electrolytic condensers, should read above .1 megohm. In checking electrolytic condensers, the black test lead (COM jack) should be connected to the positive terminal of the condenser.

Checks of insulation resistance for motors, generators, telephone cables, power cables, etc., can be made on the high ohmmeter range of your 630-NA. The actual value of resistance may vary from a few megohms to over 100 meg., depending on weather conditions and quality of insulation. The best method, therefore, is to make periodic checks on important cables or equipment and observe the trend in readings. As the readings tend to be lower and lower, it is time to start drying out the equipment or determine the cause of deterioration. Dirt, mice, or foreign matter can sometimes cause excessive leakage.

Audio Specialist

The model 630-NA is the ideal instrument for audio engineering and maintenance. The frequency compensation in this instrument will allow you to read volume level from 35 cps to 20KC.

MAINTENANCE

Battery Replacement

Two batteries are used for the ohmmeter circuits, a 1.5 volt Burgess No. 2 or equivalent and a 30 volt Eveready No. 413 or equivalent.

When the meter pointer can no longer be adjusted to zero (see page 10) ohms on the ΩX1, ΩX10, or ΩX1000 ranges, replace the 1.5 volt battery.

When the meter pointer can no longer be adjusted to zero ohms on the ΩX10,000 and ΩX100,000 range, replace the 30 volt battery.

To replace batteries, remove the four screws in the bottom of the case and lift panel from the case. Remove the old battery and replace with a new one.

Fuse Replacement

A one ampere fuse is incorporated in the ohm circuits for protecting the ohm circuit when it is accidentally placed across high voltage. A spare fuse is attached to unit inside the tester.

Note: This fuse is in series with ohmmeter circuit and is physically mounted on the back of the meter housing.
You are cautioned not to substitute the indicated 3AG Littlefuse for it can disturb the balance of the circuit and read in error.

Cleaning Plastic Window

The plastic window has been treated at the factory to dissipate static charges. If cleaning is required, use cotton dipped in a solution of common household detergent and water. After cleaning, allow the solution to dry without rubbing.

Care

Avoid placing your tester on a bench where machine tools are used or severe vibration is encountered.

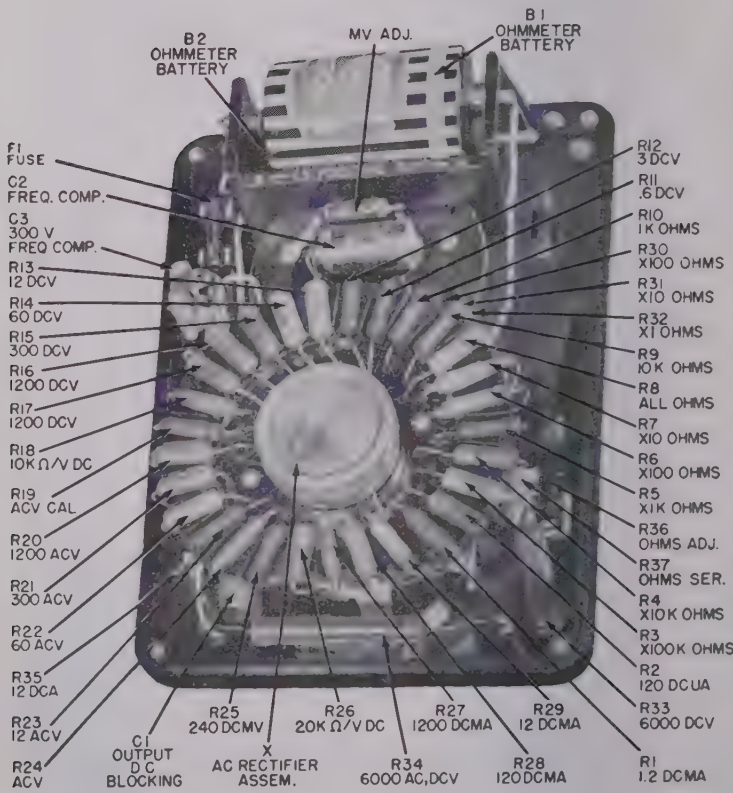
If the unit has not been in use for a long period of time, rotating the switch in both directions several times will wipe the contacts clean for good contact.

In use, don't take chances on overloading the resistors or shunts. If in doubt as to the approximate reading always start with the highest range.

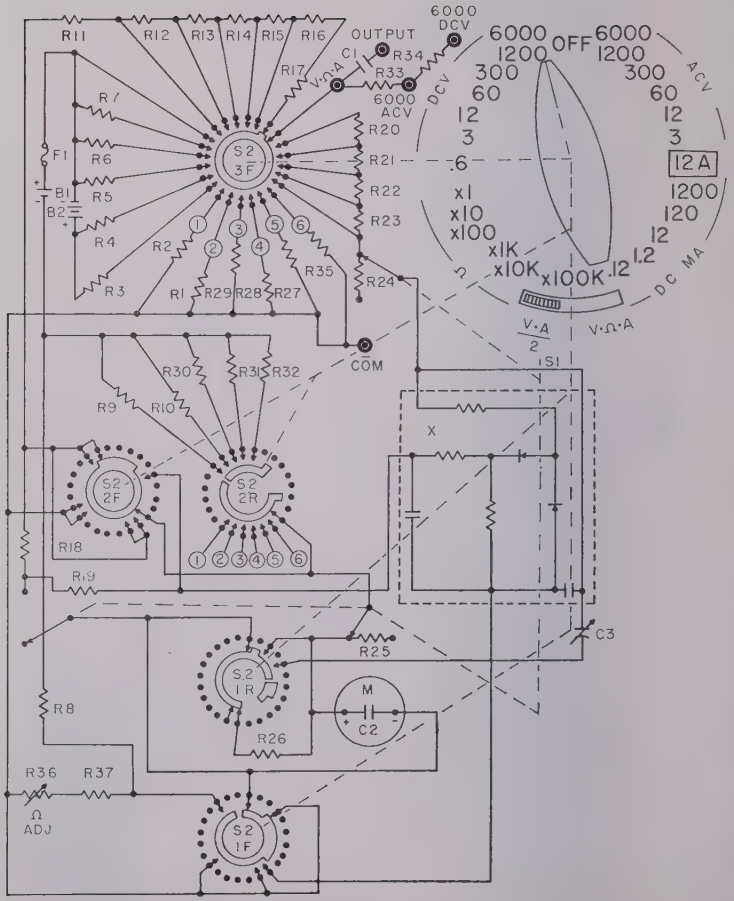
Turn the selector switch to OFF when the unit is to be carried. With the selector switch in the OFF position the meter is damped and this will prevent wild swinging of the pointer.

INTERIOR VIEW

PARTS LOCATION

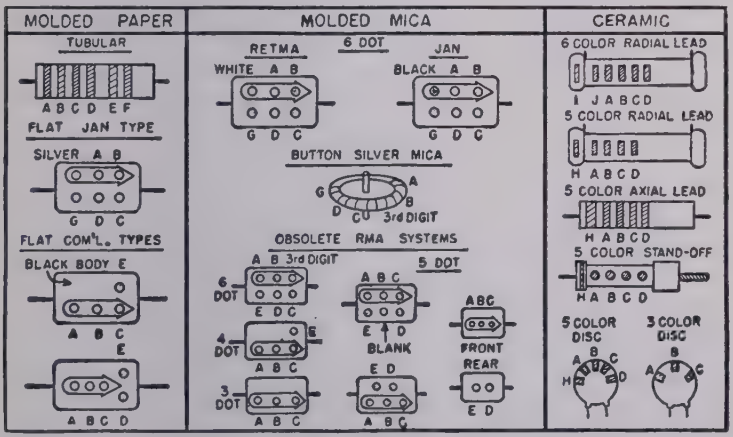


REF. NO.	REQ.	NAME	DESCRIPTION	TRIPLETT NO.
R1	1	Resistor	Film type, 218.2 ohm, ±½%	T-15-2567
R2, R26	2	Resistor	Film type, 12K, ±½%, ½W, 2½" leads	T-15-2522
R3	1	Resistor	Film type, 423K, ±½%, ½W	T-15-4110
R4	1	Resistor	Film type, 42.3K, ±½%, ½W	T-15-4124
R5	1	Resistor	Film type, 732 ohm, ±1%	T-15-4119
R6	1	Resistor	Film type, 71 ohm, ±1%	T-15-4125
R7	1	Resistor	Wire, 6.5 ohm, ±½%	T-15-4114
R8	1	Resistor	Film type, 14K, ±1%, ½W	T-15-4121
R9	1	Resistor	Film type, 1880 ohm, ±½%, ½W	T-15-4123
R10	1	Resistor	Film type, 4690 ohm, ±½%, ½W	T-15-4112
R11	1	Resistor	Film type, 3600 ohm, ±½%, ½W	T-15-2540
R12	1	Resistor	Film type, 24K, ±½%, ½W	T-15-2541
R13	1	Resistor	Film type 90K, ±½%, ½W	T-15-2543
R14	1	Resistor	Film type, 480K ±½%, ½W	T-15-2544
R15	1	Resistor	Film type, 2.4M ±½%, ½W	T-15-2513
R16, R17, R20	3	Resistor	Film type, 4.5M, ±½%, ½W	T-15-1554
R18	1	Resistor	Film type, 4800 ohm, ±½%, ½W, 2½" lds.	T-15-2568
R19	1	Resistor	Film type, 5230 ohm, ±½%, ½W	T-15-4104
R21	1	Resistor	Film type, 1.2M, ±½%, ½W	T-15-1553
R22	1	Resistor	Film type, 240K, ±½%, ½W	T-15-1552
R23	1	Resistor	Film type, 45K, ±½%, ½W	T-15-1551
R24	1	Resistor	Film type, 500 ohm, ±1%, ½W	T-15-1178
R25	1	Resistor	Film type, 2400 ohm ±½%, ½W	T-15-2539
R27	1	Resistor	Wire, .1972 ohm, ±¼%	T-15-2371
R28	1	Resistor	Wire, 2 ohm, ±¼%	T-15-2372
R29	1	Resistor	Wire, 20.1 ohm, ±¼%	T-15-2373
R30	1	Resistor	Film, 377 ohm, ±½%	T-15-4122
R31	1	Resistor	Film type, 37.2 ohm, ±½%	T-15-4115
R32	1	Resistor	Wire, 3.7 ohm, ±¼%	T-15-3424
R33	1	Resistor	Film type, 24M, ±1%, 2W, No. 18 lead.	T-15-2464
R34	1	Resistor	Film type, 24M, ±1%, 2W	T-15-1226
R35	1	Shunt	12 Amp	T-90A-378
R36	1	Resistor	Variable, 20K	T-16-31
R37	1	Resistor	Composition, 3600 ohm, ±5%, ½W	T-15-1456
C1	1	Capacitor	0.1 mfd., 400V, Midget Sprague No. 68P21	T-43-69
C2	1	Capacitor	1 mfd., 200V, Aerovox P-82	T-43-176
C3	1	Capacitor	Arco No. 466, 80-480 mmfd.	T-43-199
B1	1	Battery	1.5V Burgess #2, Flash lite "D" cell or NEDA No. 813	available locally
B2	1	Battery	30V Burgess, U20E, Eveready No. 413 or NEDA No. 210	
M	1	Meter	40 Micro-amps, 120 Millivolts	T-52-1017
X	1	Rectifier	Assembly	T-2250A-24
S1, S2	1	Switch	4 deck, 24 position without res.	22A-456
	1	Knob	Molded, Selector switch (with clip)	34B-62
	1	Knob	Molded, slide switch	T-34B-47
	1	Clip	Tinnerman, knob retaining	2451-51
	1 pr.	Leads	Banana type	T-79-127
	1	Case	Bakelite, with handle	T-10-784
	1	Front	Clear plastic with zero adj.	T-10-1225
	1	Ball	Bearing 1/8D, Slide Switch	10779
	1	Spring	Helical, Ball retaining	T-42-148
	1	Plate	Slide type, Knob retaining	10784
	5	Contact	Jack	8944
	1	Clip	Shunt retaining	T-2451-6
S1, S2	1	Switch	4 deck, 24 position, with res.	22-458
F1	2	Fuse	1 amp. Littelfuse 3AG, 312001	3207-15


R11
R12
R13
R14
R15
R16
R17
R7
R6
R5
R4
R3
R2
R1
R20
R21
R22
R23
R24
R35
R29
R28
R27
F1
B1
B2
S2 3F
OUTPUT
C1
R34
R33
V·Ω·A
6000 DCV
6000 ACV
DCV
ACV
OFF
6000
1200
300
60
12
3
6
x1
x10
x100
x1K
x10K
x100K
.12
1.2
12A
1200
120
12
DC MA
V·A
2
V·Ω·A
COM
S1
R30
R31
R32
R9
R10
X
S2 2F
S2 2R
R18
R19
C3
R25
S2 1R
M
C2
R8
R26
R36
R37
Ω ADJ
S2 1F

EIA MICA CONDENSER COLOR CODE

Color	MOLDED PAPER Multiplier	Tolerance	MOLDED MICA Multiplier	Tolerance	CERAMIC Multiplier	Tolerance
Black	1	20%	1	20%	1	20% or 2.0$\mu\mu$fd.*
Brown	10		10		10	1%
Red	100		100	20% EIA	100	2%
Orange	1000		1000	3% EIA	1000	2.5% EIA
Yellow	10,000	5%	10,000		10,000	
Green				5% EIA		5% or 0.5$\mu\mu$fd.*
Blue						
Violet						
Gray					0.01	0.25$\mu\mu$fd.*
White		10%			0.1	10% or 1.0$\mu\mu$fd.*
Gold	0.1	5%	0.1			
Silver		10%	0.01	5% (JAN) 10%		* Capacitance
None		20%				less than 10$\mu\mu$fd.



(Courtesy Popular Electronics)

Capacitance is given in $\mu\mu$fd.

Colors—Same value as on resistors except as indicated in tables.

COLORS	INDICATES
A	First digit
B	Second digit
C	Multiplier
D	Tolerance
E & F	Voltage Rating in hundreds of volts

[(E) Ratings less than 1000 volts. (E) & (F) First two digits of ratings 1000 volts or more. Values of colors for (E) & (F) are same as in resistance values. (G) is class or characteristics of capacitor. (H), (I) & (J) give temperature coefficient. (G), (H), (I) & (J) are not listed in the tables.]

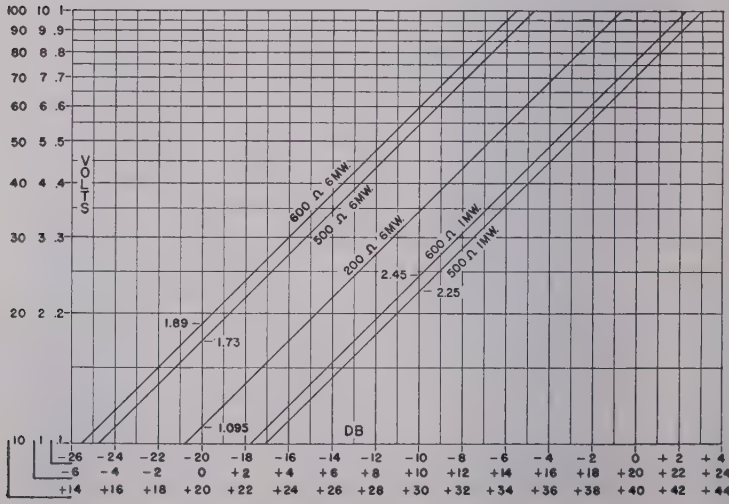
A. F. or Decibels

Audio output generally is measured in units called Decibels, a terminology used to indicate audio power levels in an amplifier to telephone work. Zero DB is set at .775 Volts, this being the voltage developed across a 600 Ohm line when .001 Watt is dissipated in the line.

DO NOT confuse the DB with the VU (Volume Unit.) The VU is based on .001 Watt dissipated in a 600 ohm line and is measured with a meter having special ballistic characteristics.

Decibels are measured by means of the Black DB Scale. Leads connected as shown on page 15.

For reading DB other than 600 ohm line use chart below.



DB CHART

0 DB at 1 Mw Decibels with 600 ohm line	Line Power Mw	RMS Volts with line Imped. of 600 ohms
—20	.01	.0775
—10	.1	.245
—5	.316	.436
0	1.00	.775
+10	10.0	2.45
+15	31.6	4.36
+20	100	7.75
+30	1000	24.5
+40	10,000	77.5
+50	100,000	245.
+60	1,000,000	775.
+70	10,000,000	2450

Note:

The range of audibility can be considered to lie from 70 db below the normal speech level to 70 db above the same level, or a total range of 140 db.

EIA SPEAKER COLOR CODE

Voice — Coil:

Green — finish
Black - - start

Field Coils:

Black and red — start
Yellow and red — finish
Slate and Red — tap (if any)

EIA WIRING COLOR CODE

B+ - - - - - - - Red
Ground - - - - - - Black
Plate - - - - - - - Blue
Grid - - - - - - Green
Cathode - - - - Yellow
High Heater - - - Brown
Low Heater - - - Black
Screen Grid - - - Orange
AVC - - - - - - White

EIA TRANSFORMER COLOR CODE

I. F. Transformers:

Blue — plate lead
Red — "B" + lead
Green — grid (or diode) lead
Black — grid (or diode) return

NOTE: If the secondary of the i. f. t. is center-tapped, the second diode plate lead is green-and-black striped, and black is used for the center-tap lead.

Power Transformers:

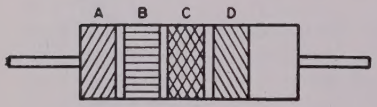
1. Primary Leads.....Black
   If tapped: Common.....Black
   Tap.....Black and Yellow Striped
   Finish.....Black and Red Striped
2. High-Voltage Plate Winding.....Red
   Center-Tap.....Red and Yellow Striped
3. Rectifier Fil. Winding.....Yellow
   Center-Tap....Yellow and Blue Striped
4. Fil. Winding No. 1.....Green
   Center-Tap.....Green and Yellow Striped
5. Fil. Winding No. 2.....Brown
   Center-Tap.....Brown and Yellow Striped
6. Fil. Winding No. 3.....Slate
   Center tap.....Slate and Yellow Striped

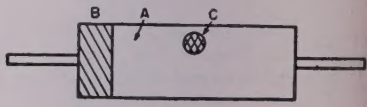
A. F. Transformers:

Blue — plate (finish) lead of primary
Red — "B"+ lead (this applies whether the primary is plain or center-tapped).
Brown — plate (start) lead on center tapped primaries (Blue may be used for this lead if polarity is not important.)
Green — grid (finish) lead to secondary
Black — grid return (this applies whether the secondary is plain or center-tapped.)
Yellow — grid (start) lead on center tapped secondaries. (Green may be used for this lead if polarity is not important.)

Note: These markings apply also to line-to-grid, and tube-to-line transformers.

EIA RESISTOR COLOR CODE





Color	Indicates
A	First number
B	Second number
C	Number of zeros
D	Tolerance

Color	Number	Color	Number
Black	0	Violet	7
Brown	1	Gray	8
Red	2	White	9
Orange	3	Gold	5% tolerance
Yellow	4	Silver	10% tolerance
Green	5	None	20% tolerance
Blue	6		

The resulting value is in ohms.

Example:
A 250,000 ohm 20% resistor.
A red B green C yellow D no color

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